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condition is estimated to have been 5 inches long. The diameter of the fang is 20 and $21\frac{1}{2}$ lines.

In the large proportion of cementum to the dentinal axis of the teeth of *Hoplocetus* they bear such a resemblance to the fragments found in the Red Crag of England, and referred by Prof. Owen to a genus under the name of *Balænodon*, as to render it probable the former is the same as the latter.

The relations of *Hoplocetus* or *Balænodon*, other than that they were toothed cetaceans, are unknown.

DELPHINUS OCCIDUUS.

An extinct species is indicated by a fossil derived from the upper miocene formation of Half-moon Bay, California, submitted to my examination by Prof. J. D. Whitney. The specimen consists of an intermediate portion of the upper jaw, devoid of teeth, and encrusted with selenite. It measures along the more perfect lateral border 5 inches, and in this extent is occupied with 19 closely set, circular alveoli, rather over 2 lines in diameter. At the back of the fragment the jaw has measured a little more than 2 inches wide. From this position it gradually tapers for half its length, and then proceeds with parallel sides to the fore end, where it is $10\frac{1}{2}$ lines wide. The palate behind is nearly plane or slightly convex; at its fore part it presents a deep median groove, closed by the apposition of the maxillaries, and this groove is separated only by a narrow ridge from the alveoli. The sides of the maxillaries are slightly concave longitudinally, convex transversely. The intermaxillaries are broken away, leaving a wide, angular gutter between the remains of the maxillaries.

Remarks on a jaw fragment of MEGALOSAURUS.

BY JOSEPH LEIDY, M. D.

A fossil worthy of notice in the Museum of the Academy consists of the fragment of a jaw, apparently of the Megalosaurus, which, if it does not belong to a different species from *M. Bucklandi*, indicates an individual larger than any one of those referred to by Buckland, Cuvier, Owen, etc. The fossil was purchased in England, and was presented to the Academy by Dr. Thomas B. Wilson. It is labelled, "Fragment d'une machoire de Megalosaurus trouvé dans le lias à Boué (or Boues). L'animal est extrêmement rare ici. Il avait 45 pied de longueur." In another hand it is marked "Jura Mts."

The fragment contains two mutilated teeth, visible throughout their length from the inner part of the jaw being broken away. The matrix adhering to the fossil consists of an oolite composed of a homogeneous clay-colored basis, with imbedded granules, of a rounded form, brown and shining.

The teeth are inserted into the jaw about two-thirds their length, and more than three-fourths the depth of the bone. They have measured $5\frac{1}{2}$ and 6 inches in length. The breadth at the base of the enamelled crown of the best preserved tooth is $14\frac{3}{4}$ lines, which is nearly the fourth of an inch greater than in the largest tooth represented in any of Prof. Owen's figures in his Monograph of the Fossil Reptiles of the Wealden Formation. A tooth apparently nearly as large in an American ally, is one referred to *Dinodon horridus*, and represented in fig. 21, pl. 9, of my memoir on the Extinct Vertebrata of the Judith River, published in the eleventh volume of the Transactions of the American Philosophical Society. The reconstructed outline of this figure is, however, too large, rendered so by the too distant removal of the apex of the tooth from the other fragment. The breadth of this specimen really did not exceed an inch.

The longest tooth of the fossil under inspection, for the most part broken away, exhibits a mould of the large interior pulp cavity. This mould, from the bottom of the latter to its broken end in the position of the crown, is $5\frac{1}{4}$ 1868.]

inches long. The broken end is 8 lines wide and $1\frac{3}{4}$ lines thick; the widest and thickest part of the mould near the middle of the length of the tooth is $11\frac{1}{2}$ lines wide and 5 lines thick.

The fangs of the teeth do not continue of the same width to the bottom, as in the teeth of crocodiles, and, as I believe, is considered to be the case in *Megalosaurus*, but from about their middle they contract, or become narrower, as is ordinarily the case in mammals. Indeed, one of these teeth isolated might be taken for the canine of a *Drepanodon*, or sabre-toothed tiger. In the fossil the bottoms of the fangs narrow antero-posteriorly, and become thinner from without inwardly, and they also curve somewhat in the latter direction.

The long fangs of the teeth in the fossil, and their becoming narrowed at bottom, at first led me to suspect the specimen belonged to a different genus from *Megalosaurus*, but a view of fig. 1, plate xii, of Prof. Owen's monograph above mentioned, seems to prove by the appearance of the successional teeth within the jaw, that the fangs actually become narrowed towards the bottom in that genus.

In the best preserved tooth of the fossil, the enamelled crown exhibits the same shape, familiar as the characteristic form of that of *Megalosaurus*. The trenchant borders of the crown are denticulate, and the enamel is comparatively smooth, or only very feebly striate.

The contracted condition of the bottom of the fangs of the teeth would leave more space than there otherwise would be for the development of successional teeth within the jaw. In the fossil the remains of one of the latter is seen at the lower part internally of one of the functional teeth, and an impression in a corresponding position of the other functional tooth indicates a similar occupant.

In the progress of the successional teeth of *Megalosaurus*, their summit first appeared at the margin of the jaw internally to the teeth in functional position. In the course of growth and protrusion they excited absorption in the contiguous bone and fang of their predecessors, and continuing to advance from within and beneath (in the lower jaw), as it were, shouldered the latter from the jaw. A third tooth in *Megalosaurus* appears to have occupied a position internal to the second one, before the protrusion of this from the jaw.

The outer portion of the jaw bone retained in the specimen has an average depth from the alveolar border of 5 inches. Its outer surface is a vertical plane, rounding only near the base.

The present opportunity is an appropriate one to make a few remarks on the American allies of *Megalosaurus*. Since I have had the opportunity of inspecting the remains of the remarkable reptile from the green sand of New Jersey, described by Prof. Cope (Proc. 1866, 275) under the name of *Laelaps aquilunguis*, in observing the comparative uniformity of the teeth, identical in character with those of *Megalosaurus*, I am more strongly impressed with the idea that the teeth of like shape forming part of those referred by me to *Dinodon*, alone belong to this genus. The others, of which no representatives have been discovered or recognized as belonging to *Megalosaurus* or *Laelaps*, most probably indicate a distinct genus and species, for which I propose the name of *Aublysodon mirandus*.

Future discovery may prove *Laelaps* and *Dinodon* identical, and, judging from the comparison of corresponding parts of the jaws and the teeth, will be found to be more closely allied to *Megalosaurus* than was suspected, even should they not prove to be generically the same.

It is clear, from an examination of the anterior portion of the mandible of *Megalosaurus* described and figured by Buckland, Cuvier, Owen, etc., that no such teeth as those now referred to *Aublysodon* occupied the forepart of the jaw. It is also probable that the upper teeth of *Megalosaurus* and of its

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allies differ in no important point from those below. It follows, therefore, that the teeth now referred to *Aublysodon*, if they belong to the maxillary or mandibular series of *Megalosaurus* or its allies, could only pertain to the back part. The variation in form of the teeth in question appears too great for such a position.

The teeth now viewed as characteristic of *Aublysodon* are represented in figs. 36—45, pl. ix of vol. xi of the Transactions of the American Philosophical Society. The specimens consist of parts of three teeth, which differ much in size and other important points. In general the crowns are laterally compressed conical, with the anterior part thick and convex transversely as well as longitudinally, and with the sides nearly parallel. The posterior part forms a surface nearly as wide as the thickness of any part of the crown, and is defined from the lateral surfaces at right angles. In the two larger teeth these angles or borders are denticulated, like the trenchant borders of the teeth of *Megalosaurus* and its American allies. In the longest tooth (fig. 35, 36, op. cit.) the posterior surface forms an even plane; in the second sized tooth (figs. 37—40) the posterior surface presents a median elevation. In the smallest tooth (figs. 41—45), which indeed may belong to a different animal from the preceding, the borders defining the posterior surface are somewhat prominent backward, non-denticulate, and subside approaching the base of the crown so as to make a transverse section in this position oval (fig. 45).

Hadrosaurus Foulkii, the bulky vegetable feeder, and cotemporary of the rapacious *Laelaps aquilunguis*, was at most probably only specifically distinct from *Trachodon mirabilis*, the teeth of which were found in association with those of *Dinodon*, so that, according to the laws of nomenclature, as *Trachodon* has priority of name, I suppose the first mentioned animal must be called *Trachodon Foulkii*, though the names of *Hadrosaurus Foulkii* and *H. mirabilis* would appear more appropriate for these powerful dinosaurs.

The best preserved tooth of those originally referred to *Trachodon*, represented in figs. 1—6 of the plate above cited, is identical in form with those referred to *Hadrosaurus*, and differs only in the absence of the regulations of the lateral borders of the crown, and in some less important points.

The remaining specimens of teeth referred with the former to *Trachodon*, are represented in figs. 7—20 of the plate cited. Most of them are so worn and probably altered from their original form, that it is rendered uncertain whether they belong to the same animal as the preceding tooth, and one unworn (figs. 18—20) has a very different shape from this. Perhaps these specimens belonged to another Dinosaur, for which the name *Trachodon* might be reserved, while that of *Hadrosaurus* might include the first mentioned and more characteristic tooth.

As *Iguanodon* had its enemy in a species of *Megalosaurus*, *Trachodon*, the representative of the former both in the western and eastern portions of the North American continent, was accompanied by an equally bloodthirsty enemy, which may, perhaps, on nearer comparison of corresponding parts, prove to be another species of the same genus, until now supposed to be different, under the names of *Dinodon* and *Laelaps*.

Prof. Cope remarks of *Laelaps* (Pr. A. N. S. 1866, 276), that "in its dentition and huge prehensile claws it resembled closely *Megalosaurus*, but the femur, resembling in its proximal regions more nearly the *Iguanodon*, indicated the probable existence of other equally important differences, and its pertinence to another genus." Thus the genus is especially distinguished by the apparent peculiarity of the femur, but in my estimation even this disappears if the bone referred to *Laelaps* be viewed in the corresponding position to that of *M. Bucklandi*, represented in pl. vii, pt. iii, of Prof. Owen's Monograph of the Fossil Reptiles of the Wealden, which appears to me to be the reversed one to that in which Prof. Cope has described it in Pr. A. N. S. 1866, 276.

The teeth of *Bathygnaethus*, a huge carnivorous reptile, whose remains have 1868.]

been found in the triassic red sandstone of Prince Edward's Island, have the same form as those of *Megalosaurus*, *Dinodon* and *Laelaps*. But here, so far as we have the corresponding parts for comparison, the resemblance ceases. The remarkable depth of the dentary bone in relation with its length in *Bathygnathus*, indicates a form of head very different from that of *Megalosaurus* and its American representatives. It was this unusual relation of depth to breadth which led me to suspect a form of head more in accordance with that of the skeleton of an upright animal, and led me to ask the question, "was this animal probably not one of the bipeds which made the so-called bird tracks of the New Red Sandstone of the valley of the Connecticut?" (See Jour. Ac. Nat. Sc. 1854, 329)

Subsequently, in examining the remains of *Hadrosaurus*, the American representative of *Iguanodon*, from the great disproportion between the fore and hind parts of the body, I was led "to suspect that this great herbivorous lizard sustained itself in a semi-erect position on the huge hinder extremities and tail, while it browsed on plants growing upon the shores of the ocean." (Cret. Rept. of the U. S. 1865, 97.)

The remains referred to *Laelaps* exhibit even a far greater disproportion between the fore and hind limbs than in *Hadrosaurus*, which, together with its long bird-like claws, etc., suggested to Prof. Cope a similar position of body to that of *Hadrosaurus*, and a use of the hind limbs in attack upon the prey of the animal analogous with that in the eagle (Pr. A. N. S. 1866, 279). The extraordinary disproportion between the fore and hind limbs of *Laelaps*, which appears to me so closely related with *Megalosaurus*, leads me to suspect that the remains described by Buckland, Cuvier, Owen and others, and attributed to the shoulder of *M. Bucklandi*, perhaps, at least in part, belong to the pelvis, if they in whole or part do not belong to other animals. Had the humerus of *Laelaps* been found isolated, I never would have thought of associating it in the same skeleton with the huge bones of the hinder extremity of that animal. Perhaps, when this great disproportion comes to be known, it may be discovered that there exist specimens of remains of the fore limbs of *Megalosaurus*, from the Wealden, in the British or other museums of England, which heretofore have excited no suspicion as to their true relations.

Teratosaurus, from the upper Keuper, in the vicinity of Stuttgart, described by Meyer (Palæontographica, 1859-61, 258), approached *Bathygnathus* most in the proportions of its face, as well as resembled it in the form of the teeth, but the fossil dentary bone of the latter is even still shorter and deeper than would relate to the fossil maxillary of the former.

Remarks on CONOSAURUS of Gibbes.

BY JOSEPH LEIDY, M. D.

In a memoir on *Mosasaurus* and the allied genera, by Dr. R. W. Gibbes, published in the second volume of the Smithsonian Contributions to Knowledge, the author described some teeth from the eocene formation of Ashley River, South Carolina, which, from their general resemblance with those of *Mosasaurus*, both in form and conjunction with osseous bases, he referred to a reptile with the name of *Conosaurus Bowmani*.

An examination of the structure of these teeth proved to me that they belonged to a fish. The body of the crown is composed of a compact vasodentine, invested, in place of enamel, with a thin layer of ordinary dentine. There is no pulp cavity in the interior; and in the complete teeth, the crown is continuous with a robust osseous fang, resembling in general appearance that of the teeth of *Mosasaurus*.

A short time since Prof. F. S. Holmes submitted to my examination the dentary bone of *Conosaurus*, imbedded in a block of white eocene marl, from

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